Impact of introduction of sharps containers and of education programmes on the pattern of needle stick injuries in a tertiary care centre in India

V. S. Richard*, J. Kenneth*, P. Ramaprabha†, H. Kirupakaran† and G. M. Chandy

*Hospital Infection Control Committee, †Staff and Students Health Centre, Christian Medical College and Hospital, Vellore, India

Summary: Documentation of needlestick injuries was started in the Christian Medical College Hospital, Vellore in 1993. In 1995 large sharps containers were introduced, accompanied by an intensive education programme. Details of documented injuries from 1993 to 1999 were analysed using the Epi-Info software. A total of 347 injuries occurred, mainly due to improper disposal of needles, re-capping and carelessness during use. The percentage of injuries attributed to disposal fell from 69.2% in 1995 to 38.5% in 1996 (after the education programme). A further decrease was noted after the additional introduction of small sharps containers. In 1995, 73% of injuries involved housekeeping staff, this fell to 12% in 1998. Relatively simple interventions decreased the numbers of injuries, and we recommend that all healthcare institutions should have a system of documenting needlestick injuries, and take measures to decrease their incidence.

Keywords: Needlestick injuries; epidemiology; blood-borne pathogens; health personnel; occupational exposure.

Introduction

Healthcare workers are at risk of acquiring infections from their patients, particularly those that are blood borne such as HIV, hepatitis B and hepatitis C. Percutaneous injuries, especially those caused by hollow needles are the commonest route for infection. The risk of transmission of HIV following a hollow needle injury has been shown to be approximately 0.3%, compared with 0.09% for mucosal exposure, and 0.009–0.09% following injury from a solid needle.1–3

In developing countries such as India, re-usable metal needles were used until the late 1980s. These were autoclaved and re-used, but with increasing knowledge about blood borne pathogens a change to disposable needles took place. Used disposable needles would be placed with other infectious waste into plastic containers in each ward. The containers would be emptied by housekeeping staff into larger containers and taken for incineration. The presence of used needles presented a hazard to those who empty the containers; therefore segregation of waste was introduced together with separate sharps containers.

Recently, devices for vascular access modified to reduce the chance of percutaneous injuries have become available. These are relatively expensive and so are not routinely used in the developing countries such as India, despite the higher prevalence of blood-borne pathogens compared to developed nations. It is nonetheless important to prevent the spread of blood-borne pathogens to healthcare workers. We describe the change in pattern of...
needlestick injuries following simple and relatively inexpensive interventions: namely intensive education programmes and the introduction of sharps containers in patient care areas.

**Method**

In 1993, the Staff and Student Health Service of the Christian Medical College Hospital, Vellore introduced a system of reporting and documenting occupational exposure to blood and body fluids and administering appropriate postexposure prophylaxis. In 1995 large containers for sharps were placed in the centre of each ward, usually in the nurse’s station or treatment room. Along with the introduction of these containers was a week-long intensive education programme on blood-borne pathogens and the importance of safe disposal of sharps. In 1998, smaller containers were introduced into all patient areas. Healthcare workers were again educated on the proper disposal of sharps and instructed to take these containers to the bedside while doing a procedure. Documented exposures from 1993 to May 1999 to blood and body fluids were analysed using the Epi-Info software.

**Results**

A total of 347 injuries due to hollow needles were documented. The main causes were improper disposal, carelessness during procedures and re-capping needles (Table I). ‘Carelessness during procedures’ included injuries to workers assisting with a procedure, and those to the non-dominant hand while removing the needle from the patient’s vein. Injuries due to a restless patient, or an irritable, fidgety child were included under ‘patient factors’. Figure 1 shows the percentage of needlestick injuries attributable to improper disposal of sharps. In 1995, 73% of injuries involved housekeeping (domestic) staff, who accounted for only 24% of injuries in 1996, and 12% in 1998.

**Discussion**

From 1993 to 1995 the proportion of needlestick injuries caused by improper disposal of sharps had increased from 42% to 69%. Thereafter this proportion fell, corresponding to the education programme and introduction of large sharps containers. A further fall was seen after the introduction of smaller containers in 1998. The main reduction was in injuries to housekeeping staff. The increase in total injuries reported in 1998 (Table I) followed better reporting stimulated by the second education programme.

Most needlestick injuries are due to preventable causes such as re-capping needles, improper disposal, or sealing a sample for blood gas analysis with a cork. Klontz et al. following a survey in Florida, found that 62% of injuries could have been

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<th>Year</th>
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Figure 1  Percentage of injuries due to hollow needles that were caused due to improper disposal of sharps (1993–1999).

| Table I  Cause implicated for percutaneous injuries by hollow needles from 1993 to 1999 |
|---------|---------------------------------|
| Re-capping | 6 | 7 | 1 | 5 | 7 | 15 | 6 |
| Improper disposal | 16 | 19 | 9 | 10 | 24 | 42 | 6 |
| Sealing blood gas sample with a cork | 1 | 5 | 1 | 1 | 3 | 4 | 2 |
| Disassembling needle and syringe | 4 | 0 | 0 | 1 | 5 | 16 | 2 |
| Carelessness during procedures | 9 | 15 | 2 | 9 | 18 | 44 | 15 |
| Patient factors | 2 | 2 | 0 | 0 | 5 | 7 | 1 |
| Total number of reported injuries | 38 | 48 | 13 | 26 | 62 | 128 | 32 |
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prevented by use of proper needle disposal tech-
niques. McCormick et al.\textsuperscript{7} demonstrated a two-fold reduction in injuries by making disposal units available at the beside. Active steps must be taken to reduce the number of such injuries. Our study shows the effectiveness of simple steps such as education and introduction of an adequate number of sharps containers. Healthcare workers should never re-cap a needle but discard it directly into a sharps container. Other measures that could help are single-handed sealing of blood gas samples and using an instrument to remove the needle from the syringe. A continuing education programme with feedback from staff is essential, and we strongly recommend that all healthcare institutions should have a system for documenting and analysing injuries, and adopt measures for their prevention.

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